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Flow in collisions of light nuclei

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We explore features of harmonic flow in ultra-relativistic collisions involving light nuclei. For the light-light nuclear collisions, such as 16O-16O reaction considered for the upcoming experimental program at RHIC and the LHC, we make definite predictions based on ratios of cumulants. We also point out very interesting aspects of the light-heavy collisions, where the light nucleus is clustered, thus carries intrinsic deformation. There has been a quest for alpha clustering in nuclei over the last 80 years, but evidence at low energies has usually been rather indirect through theoretical studies of binding energies and nuclear sizes. We present here direct experimental signatures of clusterization of light nuclei in ultra-relativistic collisions of 7,9Be, 12C, and 16O on heavy nuclei. Clustering leads to very specific spatial correlations of the nucleon distributions in the ground state of the light nucleus and in the formed fireball, which via collective evolution become manifest in the harmonic flow coefficients of the produced hadron distributions [1-3]. In particular, the elliptic flow is sensitive to clusterization in 7,9Be, and the triangular flow to clusterization in 12C and 16O.

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